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REMARKS/ARGUMENTS

I.

Favorable reconsideration of this application as presently amended is respectfully requested.

Claims 21-23, 35 and 36 are presently active in the application. Claims 1-20 and 24-34 have been cancelled. Claims 30-34 are cancelled by the present amendment. Those claims were prosecuted to issue in parent application 09/053,050 now U.S. Patent No. 6,287,504. The parent application included a restriction requirement and an election of species in the office action mailed November 30, 1999. As a result of that restriction requirement and election of species requirement, claims 30-34 were prosecuted in the parent application. Divisional applications have been filed with respect to claims 1-20, 21-23 (the present application) and claims 24-29. In the preliminary amendment filed with the present application, claims 30-34 were inadvertently not canceled. Claims 35-36 have been added by the present amendment.

II.

A substitute specification was required in parent application serial No. 09/053,050 and applicants were required to file proposed drawing changes in divisional application serial No. 09,878,977. A substitute specification and the proposed drawing changes were also filed in divisional application serial No. 09/878,987. The present application, the '977 application, and the '987 application are all divisional applications off of application serial No. 09/053,050. Accordingly, applicants have submitted the proposed drawing changes and a substitute specification herewith. Applicants respectfully submit that the proposed drawing changes and the substitute specification do not add new matter.

Applicants have further submitted a letter to the examiner requesting approval of the annotated sheets showing drawing changes and corrected drawing sheets.

II.

The rejections of claims 30-34 under 35 USC 112, second paragraph, claims 31, 33, and 34 under 35 USC 102(b) and claims 30 and 32 under 35 USC 102(b) or 35 USC 103(a) are moot because those claims have been cancelled.

III.

Claims 21-23 stand rejected under 35 USC 103(a) as being unpatentable over the admitted prior art of prior art 3 as set forth on page 3-4 of the instant specification and exemplified by Japanese document 6-304973. This rejection is respectfully traversed with respect to claim 21-23 as presently amended.

Claim 21 has been amended to recite that the compressed air causes the molten material to sink away from the vent hole and further recites “providing a at least one step in said non-transfer surface between said vent hole and said at least one transfer surface to prevent sinking of the molten material from proceeding from said at least one non-transfer surface to said at least one transfer surface.” This step is shown, for example, by the element 26 in the molten material 20 formed by the indentation 6 in the sink element 16 of the mold assembly 10 as illustrated in Fig. 7B and as described, for example, on page 13 line 9-page 14 line 2 and with respect to Embodiments 1-10 on pages 12-20 of the substitute specification. The applied reference fails to teach or suggest placing a step between the vent hole and the transfer surface in order to preclude the sunken area around the vent hole from proceeding to the transfer surface. Accordingly, applicant submits that claim 21 is allowable.

Claims 22, 23, 35 and 35 depend either directly or indirectly from claim 21. The formation of a plurality of steps in the molding as set forth in claim 35 are shown, for example, in Fig. 7A and the formation of a step in the molding completely surrounds the vent hole as set forth in claim 36 is shown, for example, in Figs. 8 and 9A. Accordingly, those claims are allowable for the reasons stated above with regard to claim 21.

IV.

As requested on page 4 of the outstanding Office Action, copies of the prior art referred to on pages 2-7 of the specification are submitted herewith together with the available English language abstracts.

V.

For the reasons stated above applicant respectfully request favorable reconsideration and allowance of claims 21-23, 35 and 36.

Respectfully submitted,

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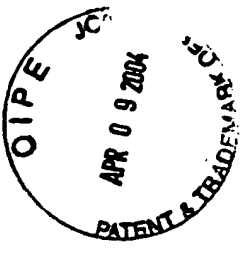


Fig. 1 PRIOR ART

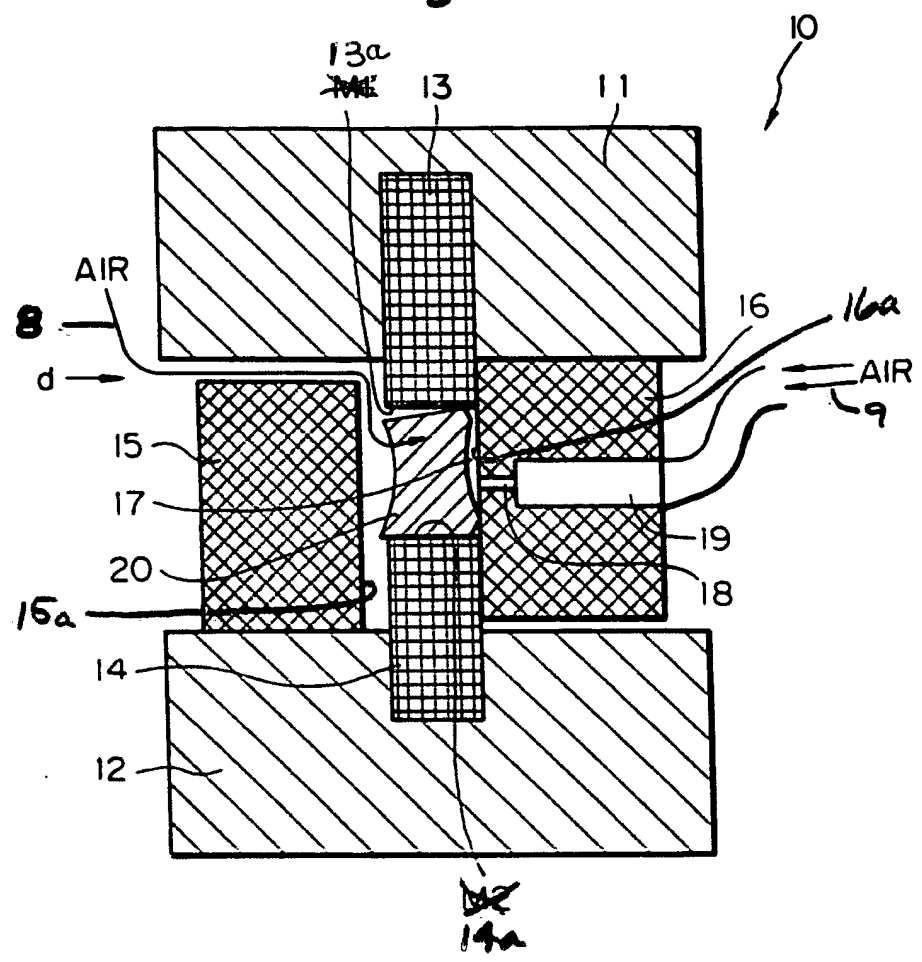
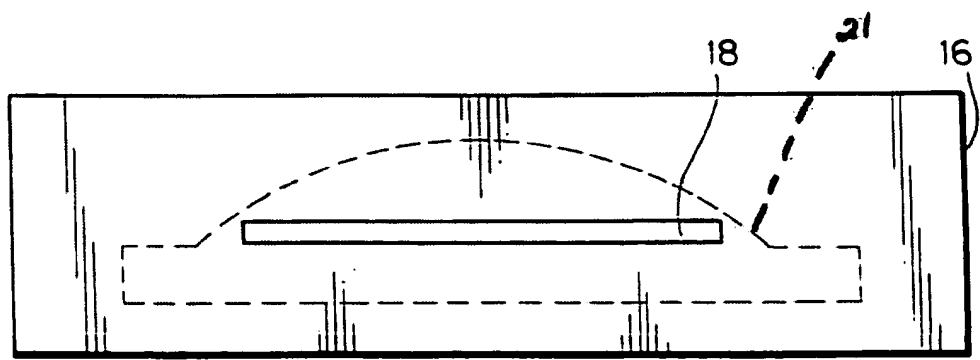


Fig. 2 PRIOR ART



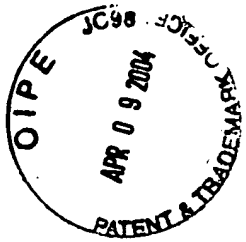


Fig. 3A PRIOR ART

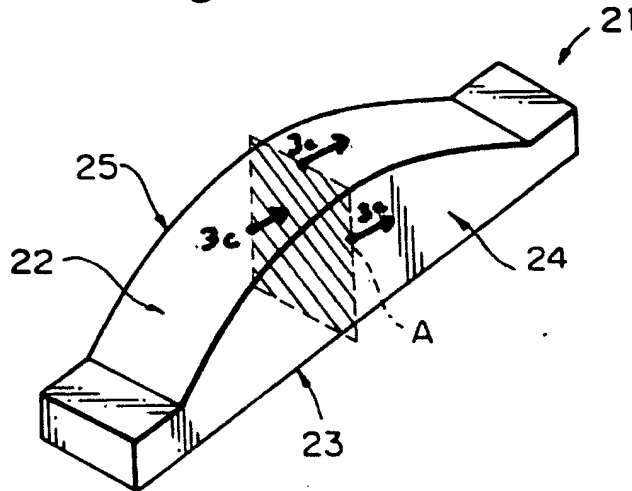


Fig. 3B PRIOR ART

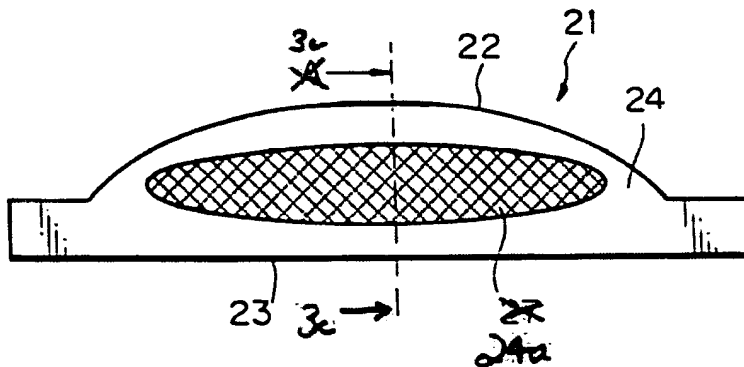


Fig. 3C

PRIOR ART

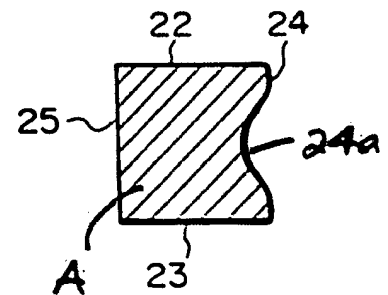


Fig. 4A PRIOR ART

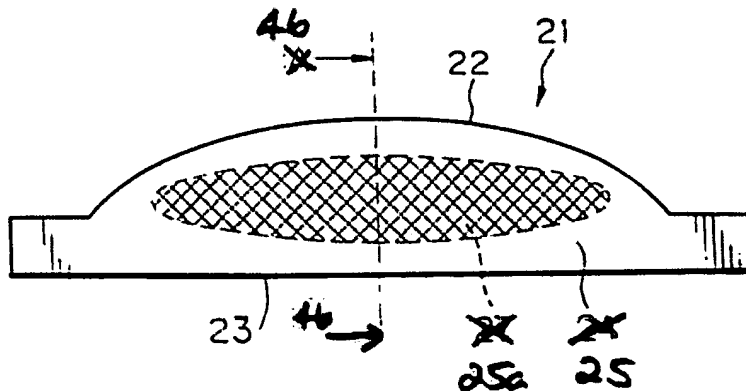
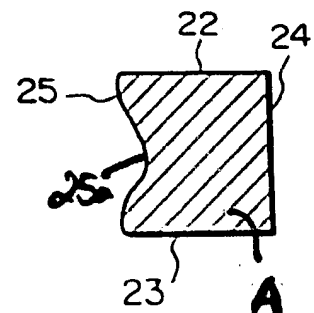


Fig. 4B

PRIOR ART



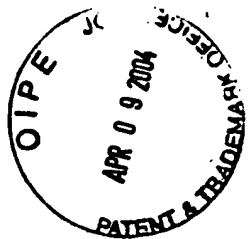


Fig. 5A PRIOR ART

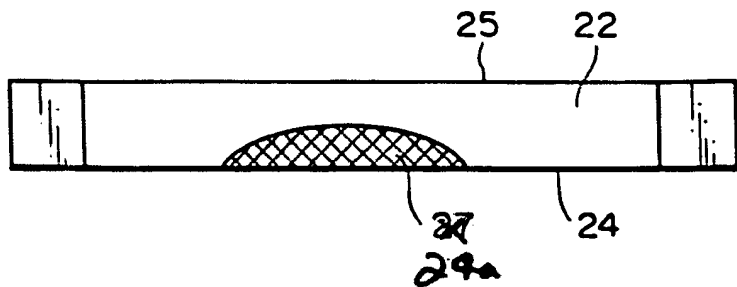


Fig. 5B PRIOR ART

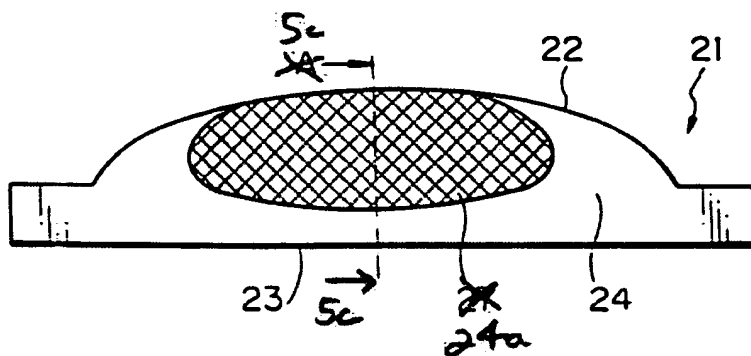


Fig. 5C

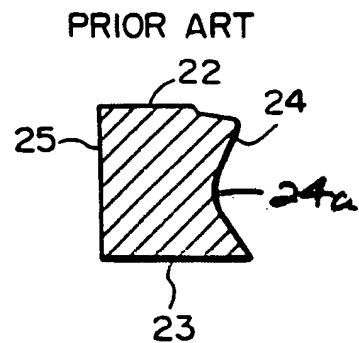
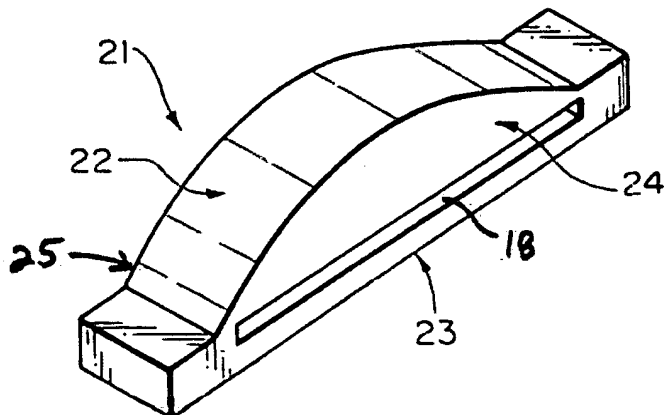


Fig. 6
PRIOR ART



OIP E JC
 APR 09 2004
 PATENT & TRADEMARK OFFICE

OBLON, SPIVAK, et al.
 Docket No: 208402US3DIV
 Inventor: Toshihiro KANEMATSU, et al.
 Serial No: 09/878,991
 Reply to OA dated: December 9, 2003
 Annotated Sheets Showing Changes

Fig. 7A

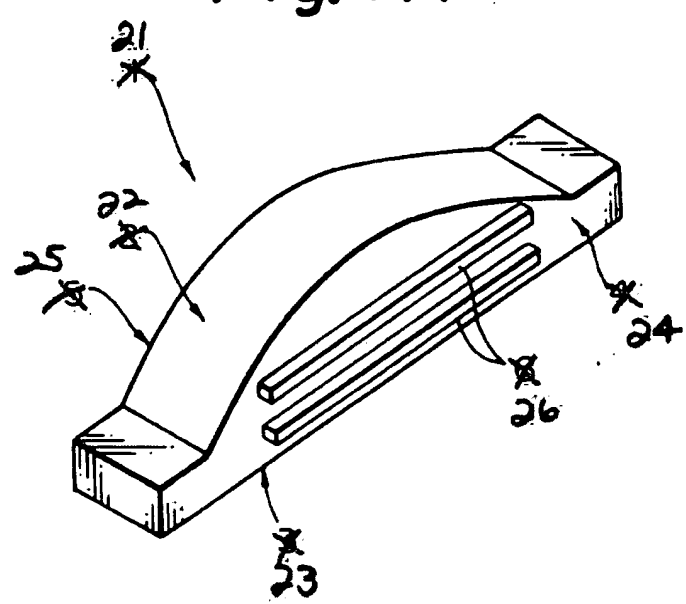
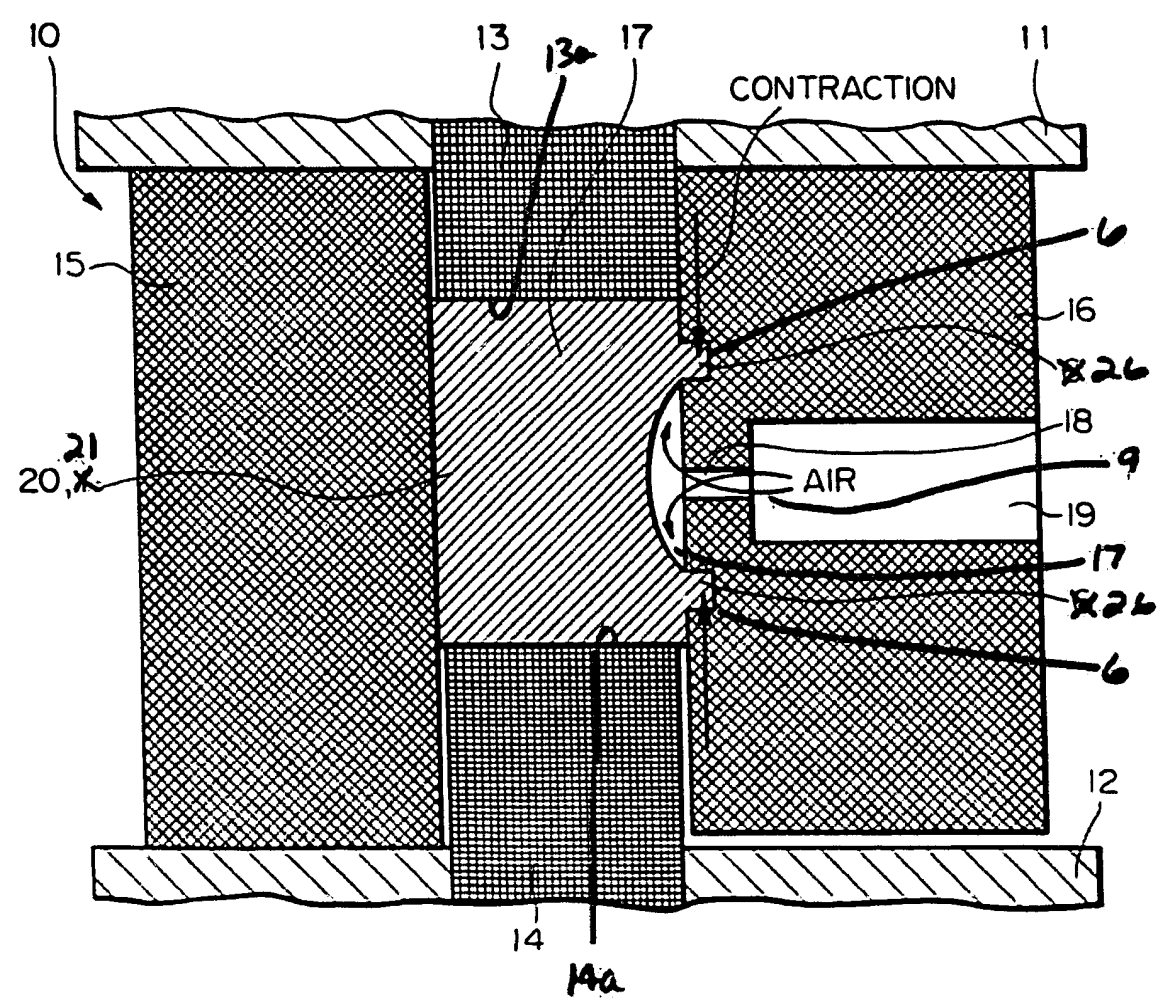


Fig. 7B



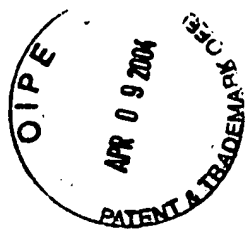


Fig. 8

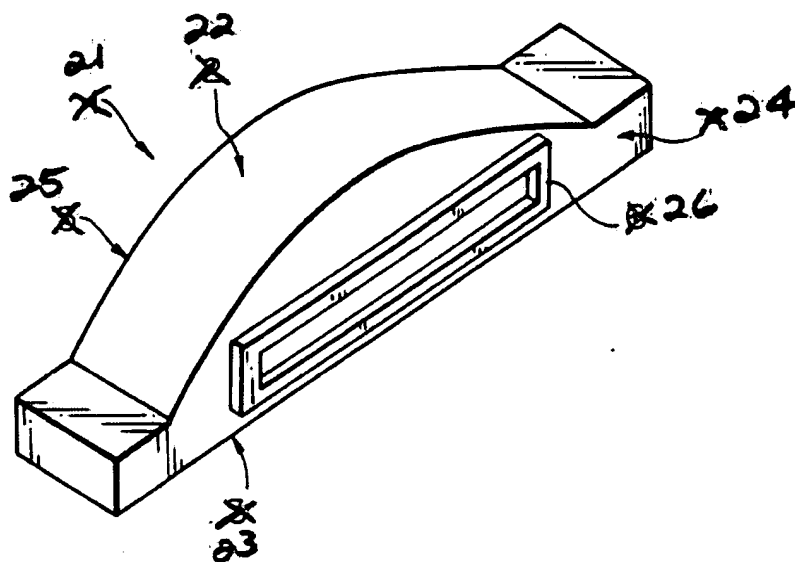


Fig. 9A

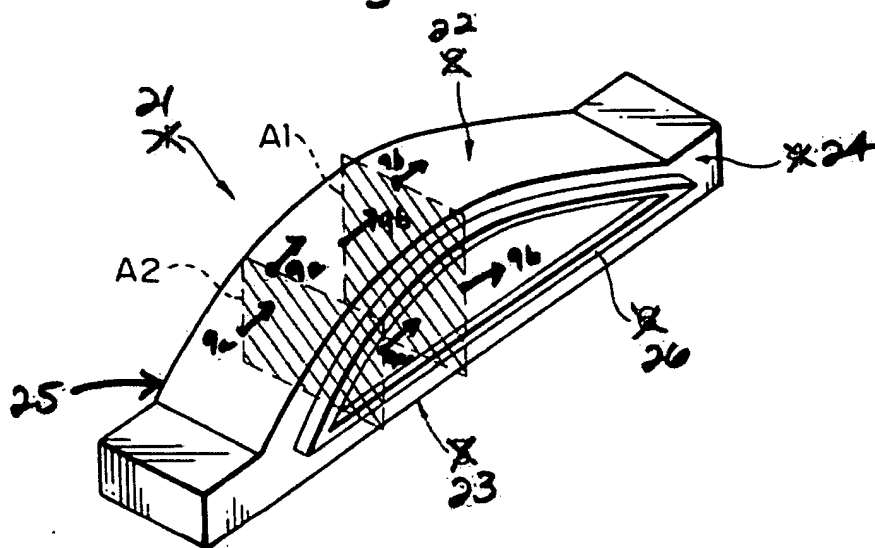


Fig. 9B

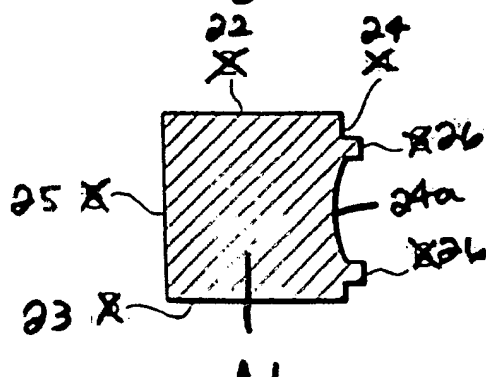
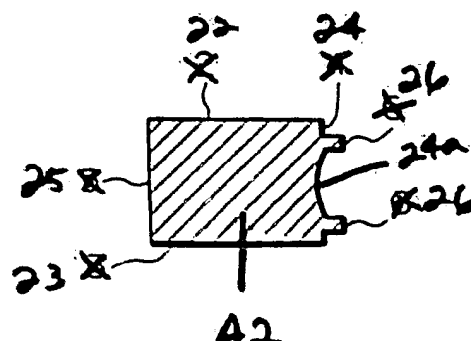


Fig. 9C



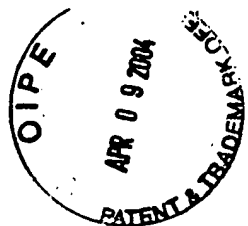


Fig. 10A

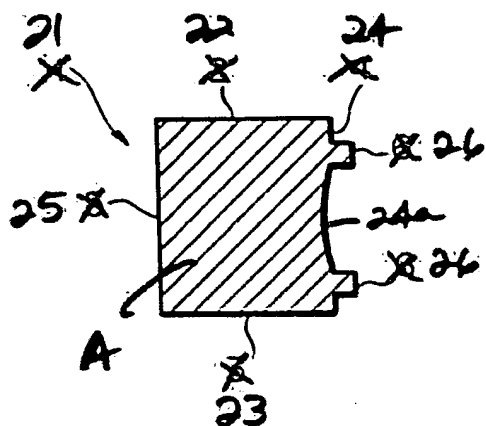


Fig. 10B

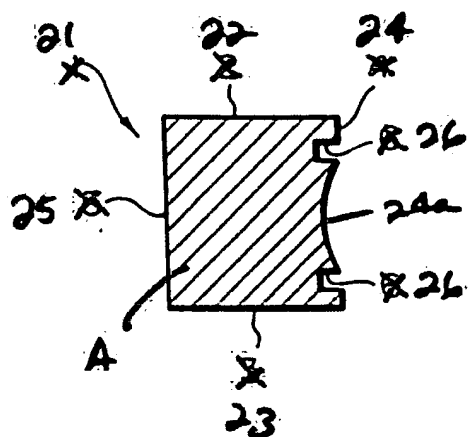


Fig. 11A

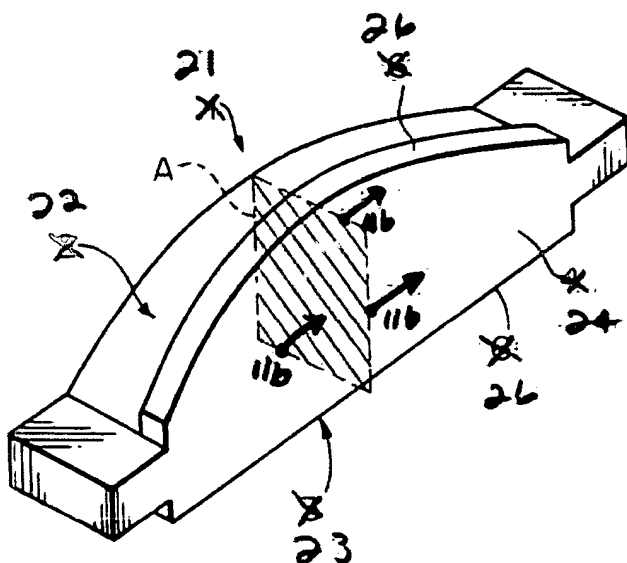
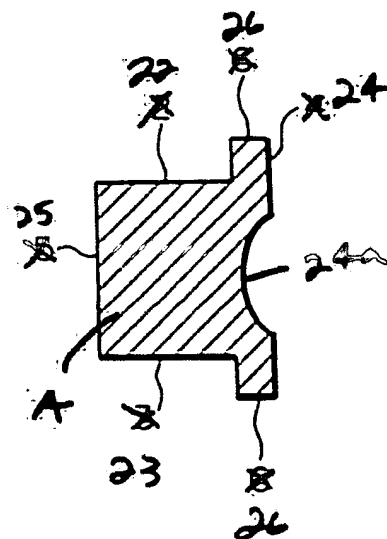


Fig. 11B



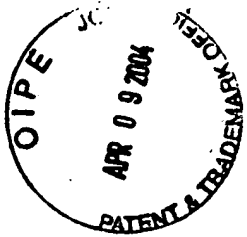


Fig. 12A

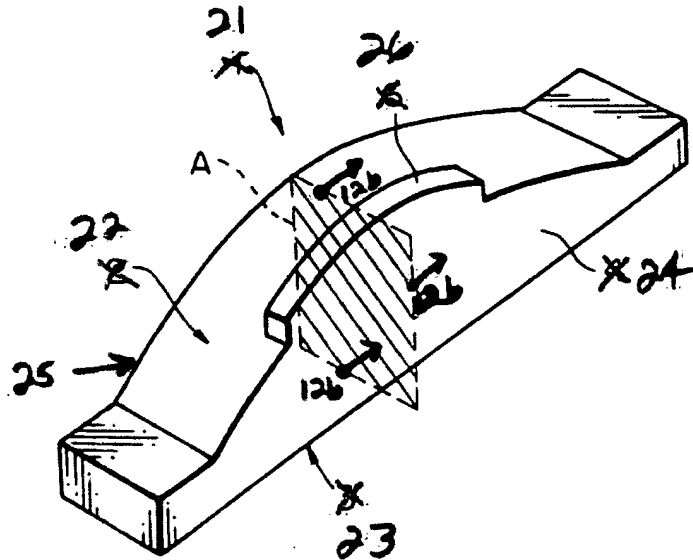


Fig. 12B

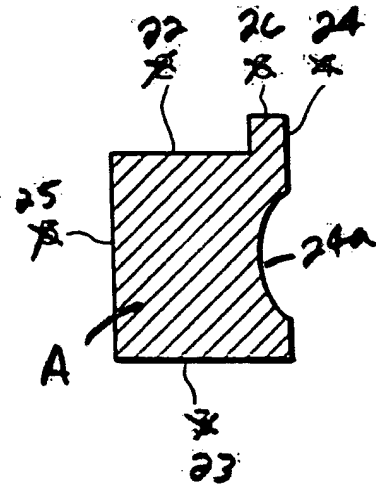


Fig. 13A

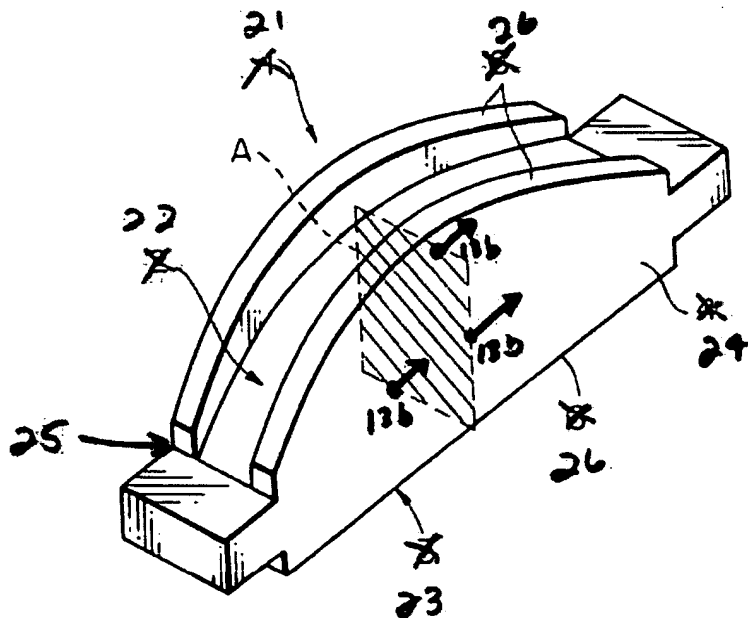
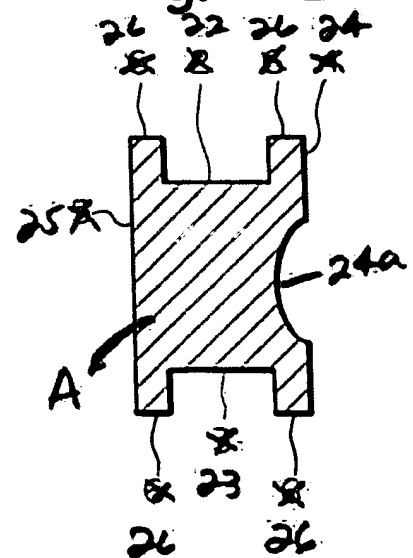


Fig. 13B



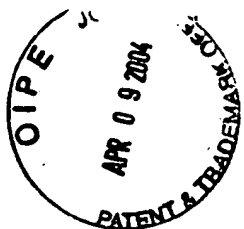


Fig. 14A

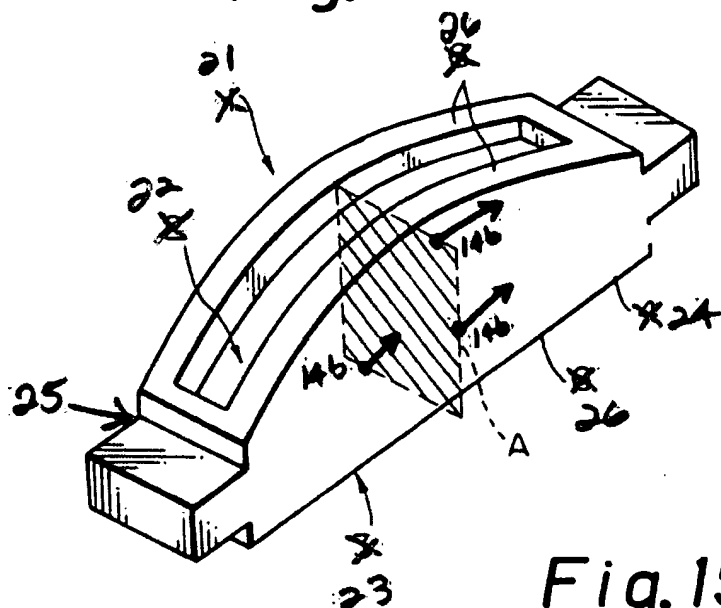


Fig. 14B

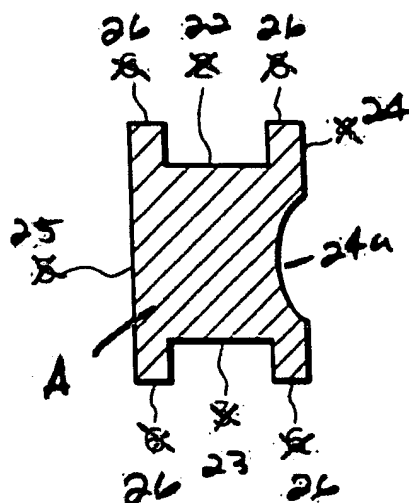


Fig. 15

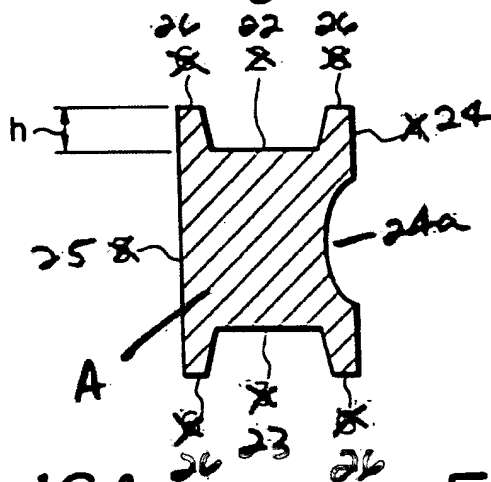


Fig. 16A

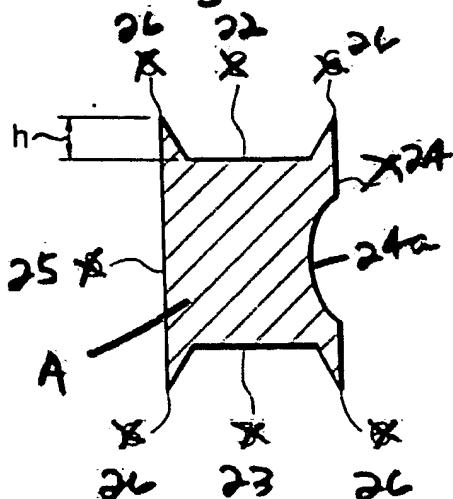
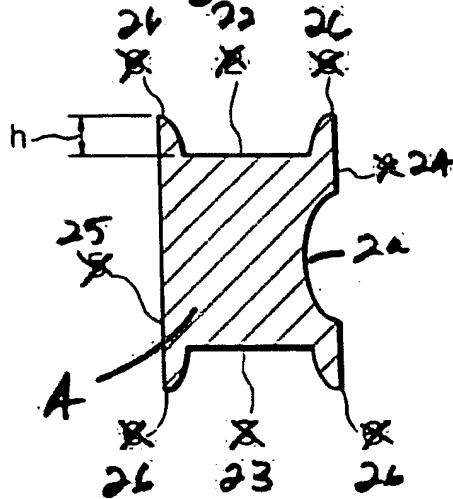


Fig. 16B



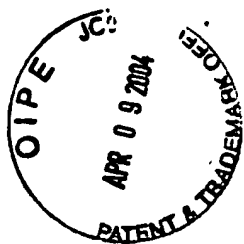


Fig. 17A

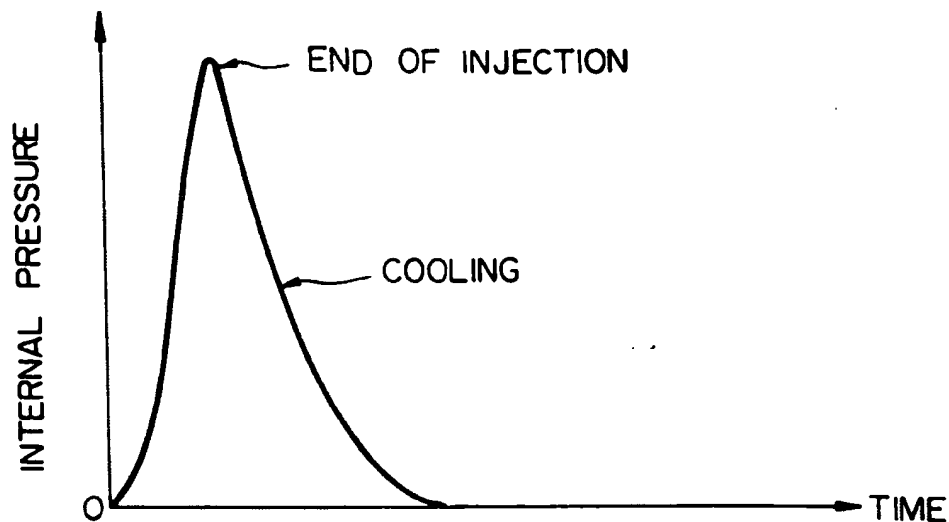


FIG. 17B

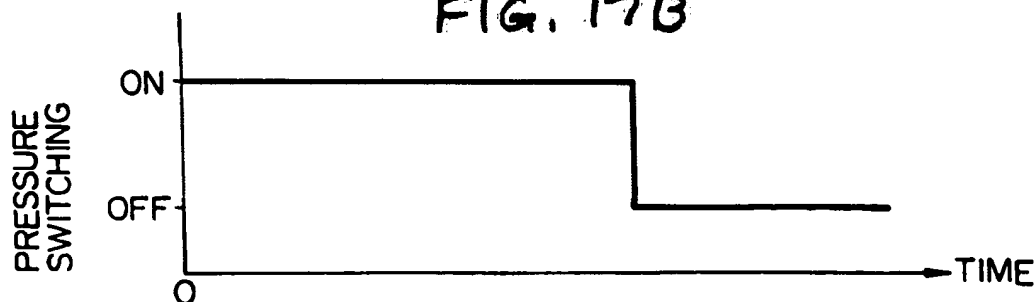
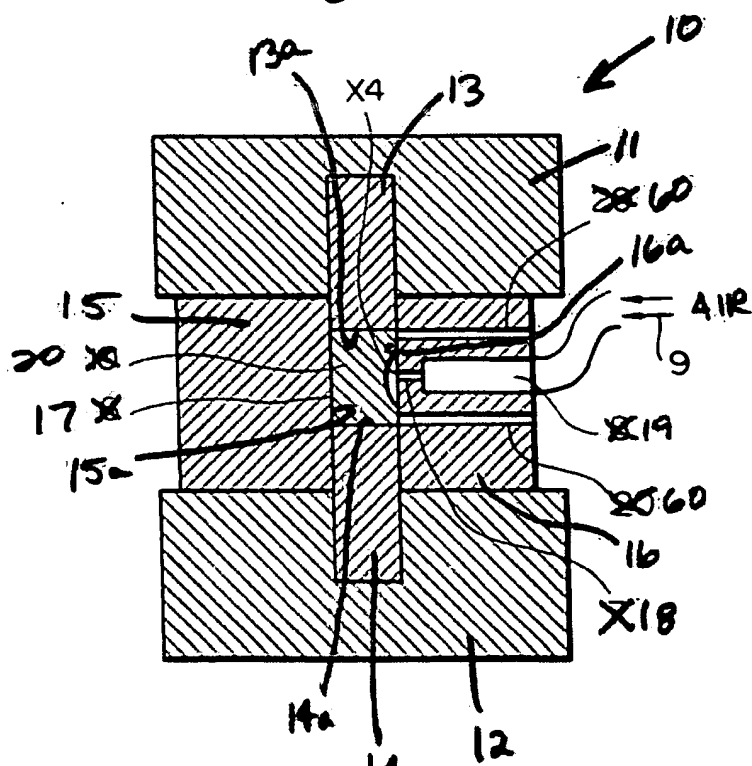


Fig. 18



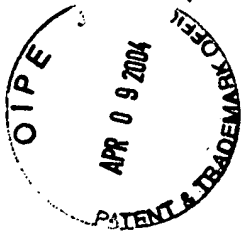


Fig. 19

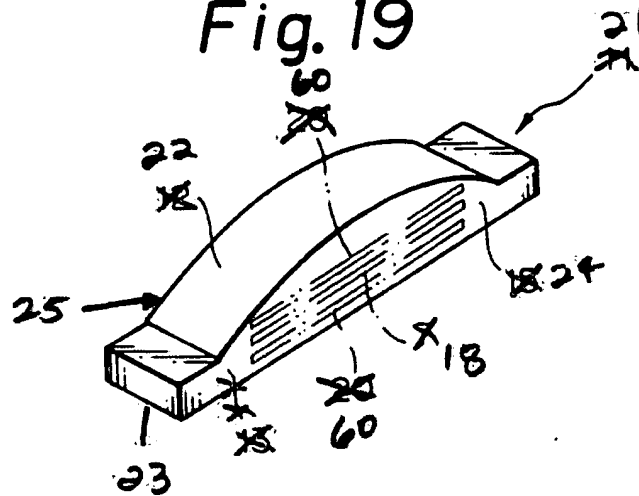


Fig. 20

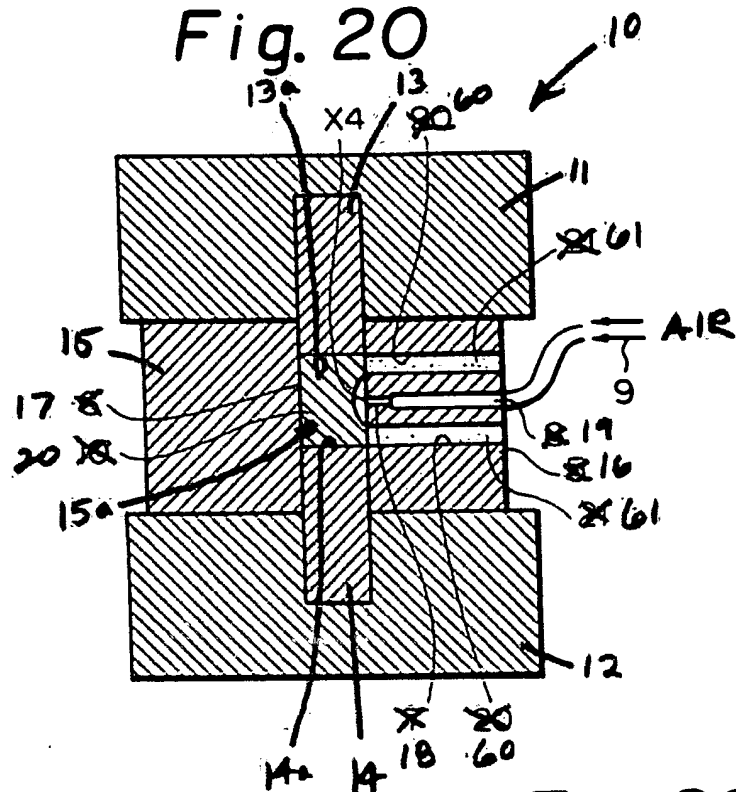


Fig. 21

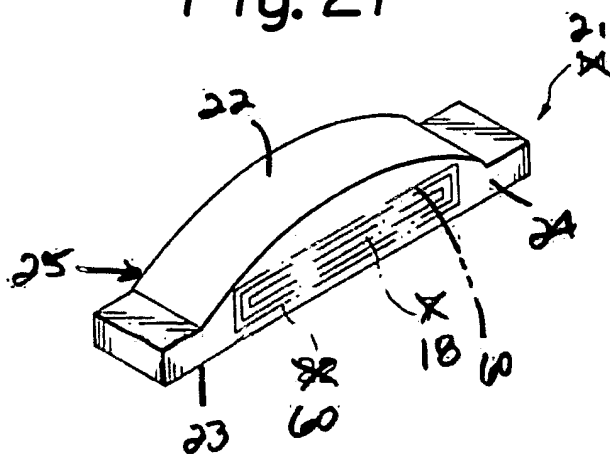
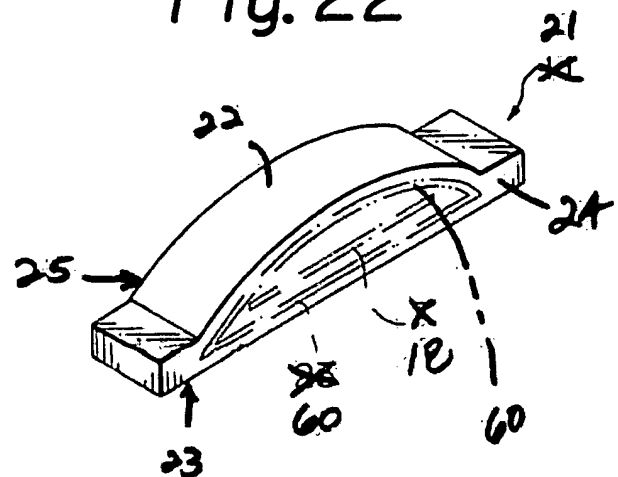


Fig. 22



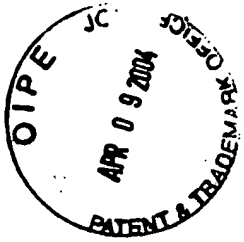


Fig. 23A

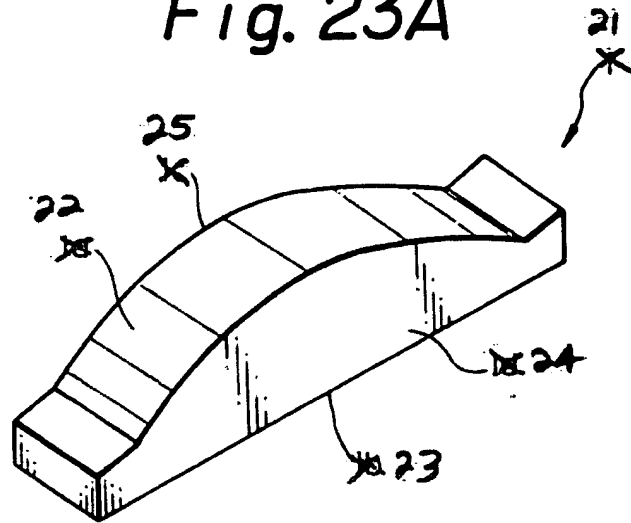


Fig. 23B

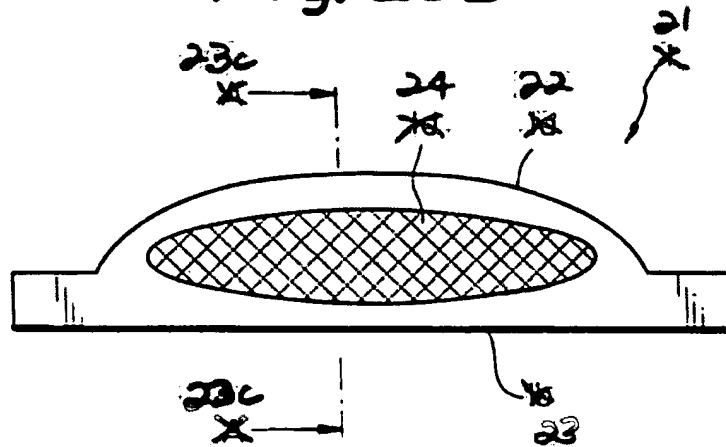


Fig. 23C

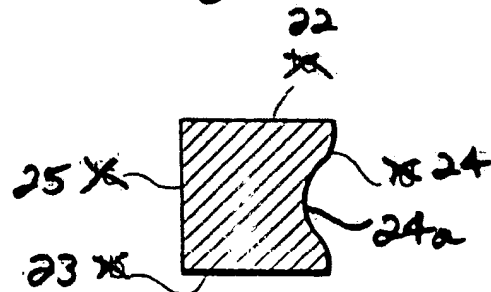




Fig. 24A

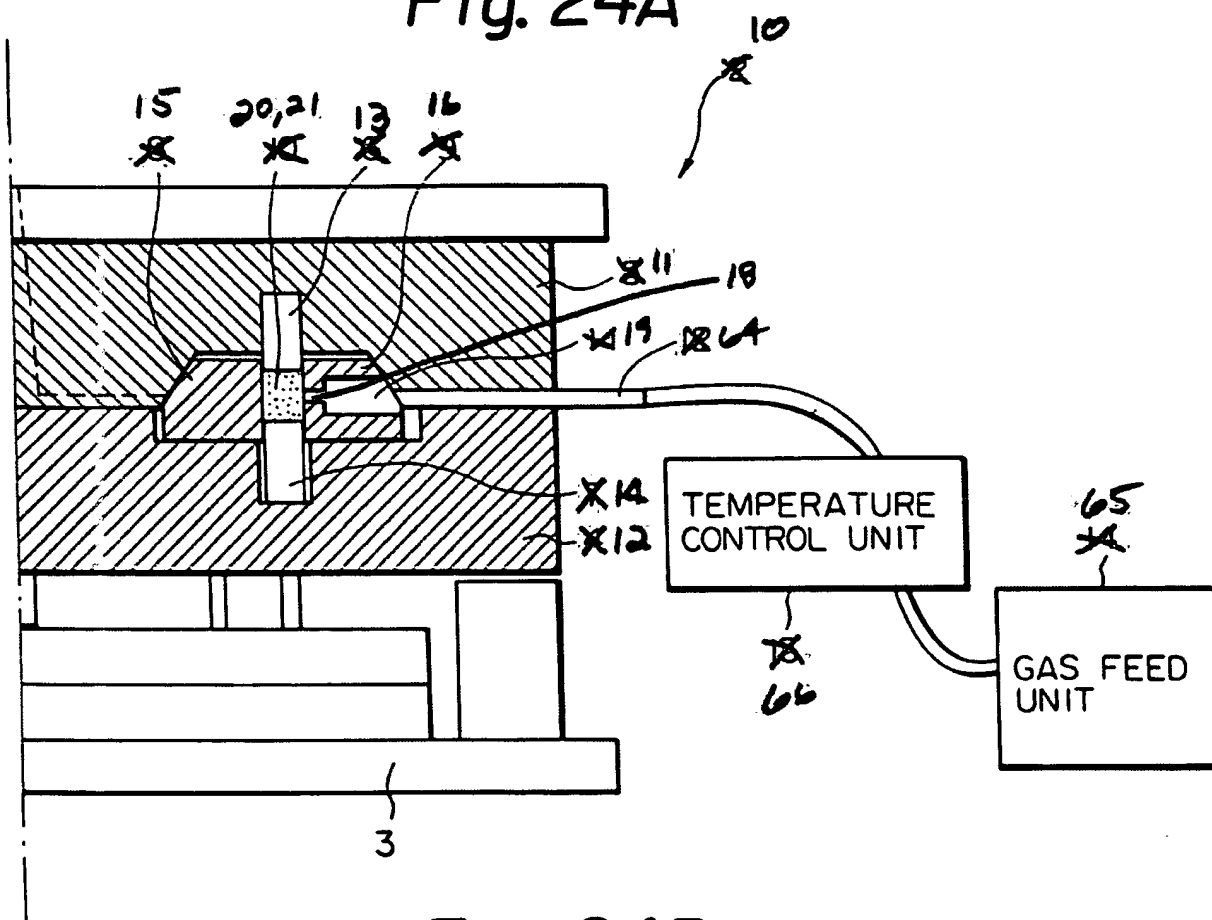
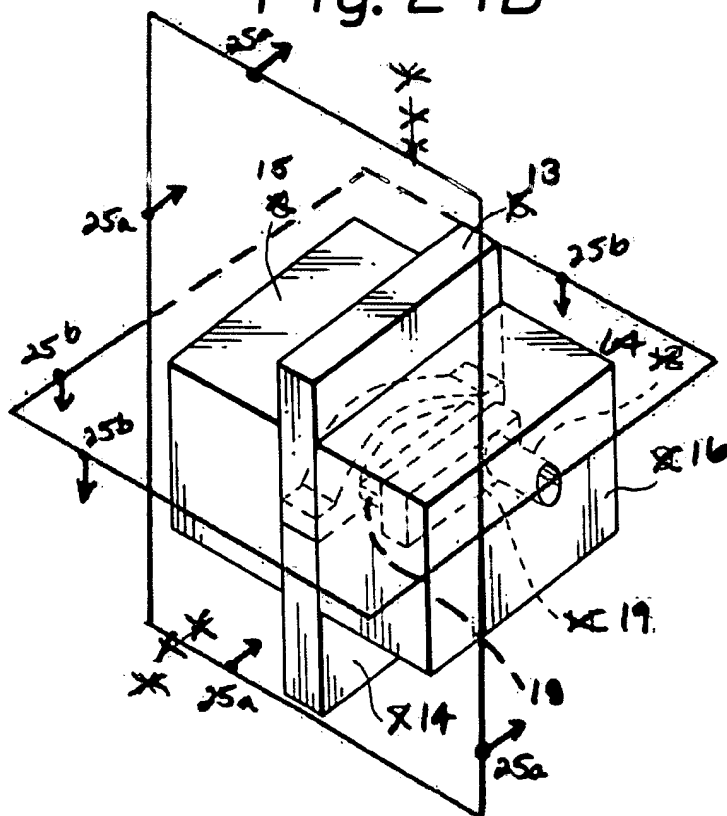


Fig. 24B



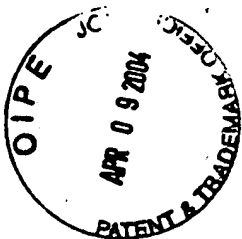


Fig. 25A

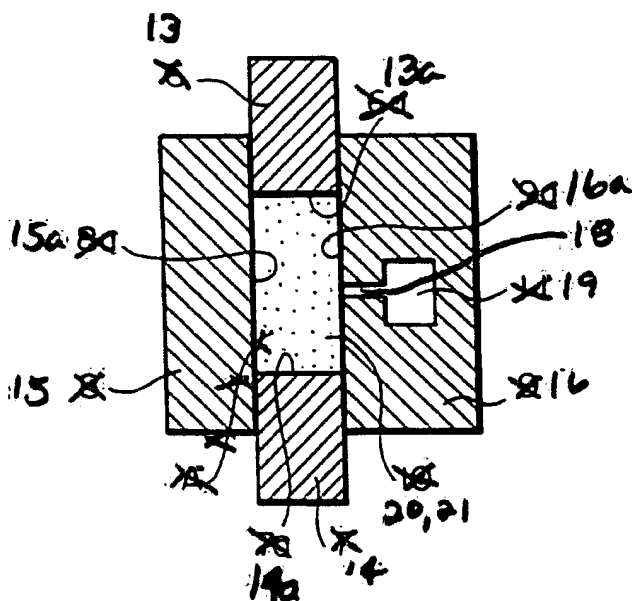
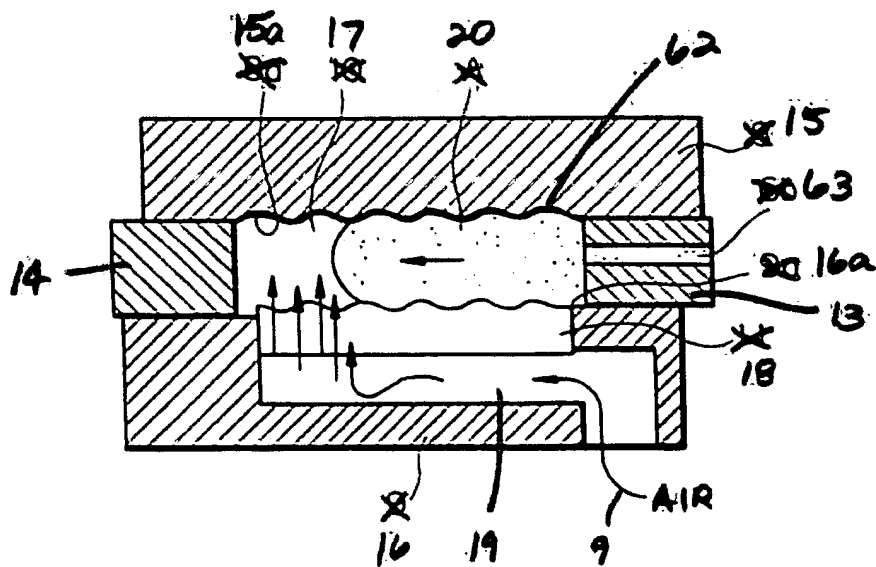


Fig. 25B



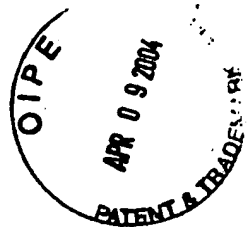
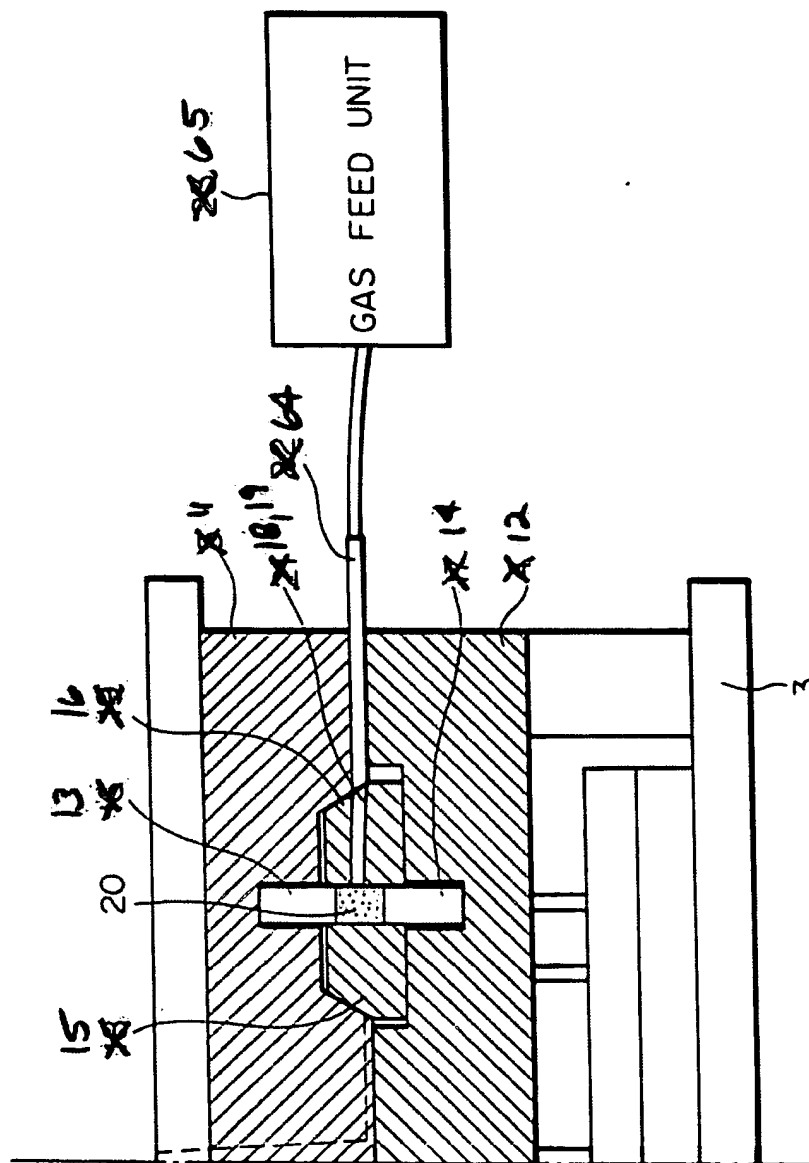


Fig. 26

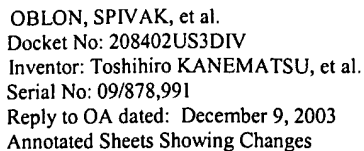


A cross-sectional view of a multi-layered structure. The top layer is labeled 17. Below it is a layer with a wavy interface, labeled 20 and 15. A central region is labeled 18. To the right, a layer is labeled 13a. Below the central region is a layer labeled 13. The bottom layer is labeled 16. A gap or channel is labeled 9 and contains the word "AIR". Various other labels include 14, 14a, 16a, 18, 19, and 21. Some labels are crossed out with an 'X'.

A cross-sectional view of a mechanical assembly. It features a central horizontal component (15) with a wavy, textured surface (62) on its top and a smooth, curved surface (63) on its bottom. This central component is flanked by two vertical components (16 and 17) on the left and right. The entire assembly is supported by a base (18, 19). A central vertical component (20) is positioned above the central component (15). The assembly is shown in a cross-section with hatching for different materials.

A cross-sectional view of a multi-layered structure. It shows a central core (15) with a wavy interface (16) separating it from a bottom layer (18). A top layer (14) is positioned above the core, with a wavy interface (19) between them. A side layer (20) is attached to the left of the core. A label 21 points to the top surface of the top layer (14). A label 18,19 points to the right side of the bottom layer (18).

A cross-sectional view of a mechanical assembly. It shows a central component (14) with a textured surface, flanked by two hatched components (15 and 16). A wavy line (62) is shown on the left side of the central component. A dashed line (20) is shown on the right side of the central component. A small rectangular feature (63) is shown on the right side of the central component. A horizontal line (13) is shown on the right side of the central component. A vertical line (18, 19) is shown on the right side of the central component.



A cross-sectional view of a multi-layered structure. It consists of three main horizontal layers. The top layer (13) is a solid block with diagonal hatching. The middle layer (14) is thinner and contains a central rectangular cavity (15) filled with a stippled pattern. The bottom layer (16) is also a solid block with diagonal hatching. A central vertical cavity (17) passes through all three layers. The bottom layer (16) contains a small rectangular feature (18) within the central cavity. Various reference numerals (13, 14, 15, 16, 17, 18, 19, 20) are used with leader lines to identify the different components and features of the structure.

A cross-sectional view of a combustion chamber assembly. The assembly includes a central combustion chamber (10) with a wavy internal surface (17). The chamber is surrounded by a combustion chamber wall (14) and a cooling jacket (16). The cooling jacket has a cooling fluid inlet (15) and a cooling fluid outlet (13). The assembly is mounted on a base (9) which has a cooling fluid inlet (18) and a cooling fluid outlet (19). The base is also surrounded by a cooling jacket (16). The assembly is shown in a cross-sectional view with various components labeled with reference numerals.

A cross-sectional view of a multi-layered structure. The top layer is labeled 14. Below it is a layer with a wavy interface, labeled 20. The middle layer is labeled 15. A wavy line separates the middle layer from the bottom layer, labeled 62. A small rectangular feature on the right side of the middle layer is labeled 63. A layer on the far right is labeled 13. The bottom layer is labeled 17. A rectangular feature within the bottom layer is labeled 18. A small rectangular feature within the bottom layer is labeled 16.

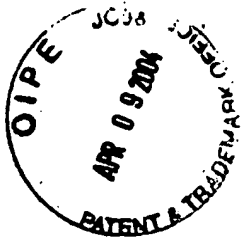
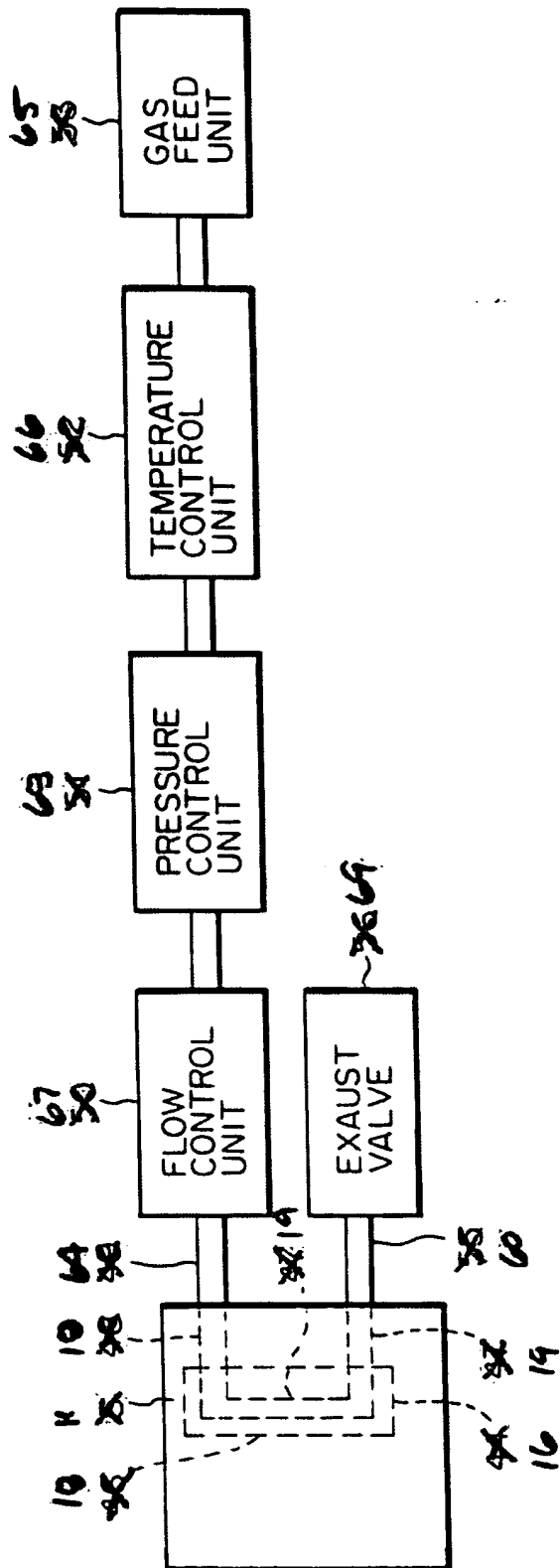
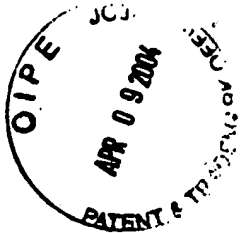


Fig. 31





OBLON, SPIVAK, et al.
 Docket No: 208402US3DIV
 Inventor: Toshihiro KANEMATSU, et al.
 Serial No: 09/878,991
 Reply to OA dated: December 9, 2003
 Annotated Sheets Showing Changes

Fig. 32A

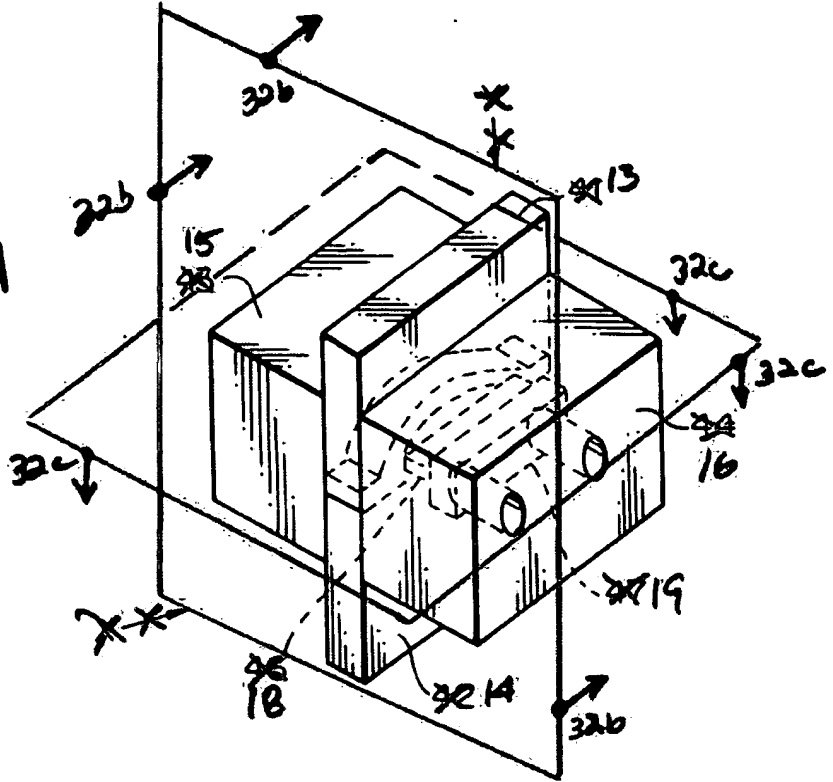


Fig. 32B

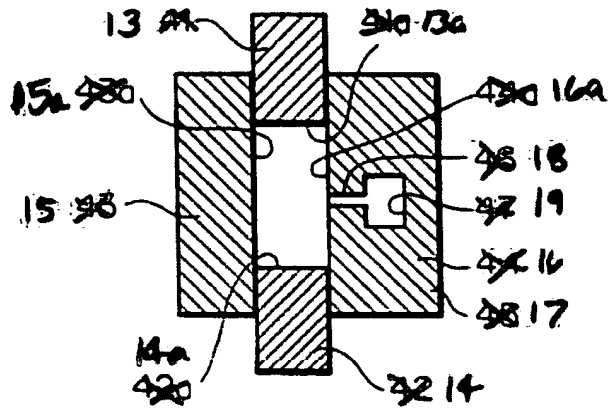


Fig. 32C

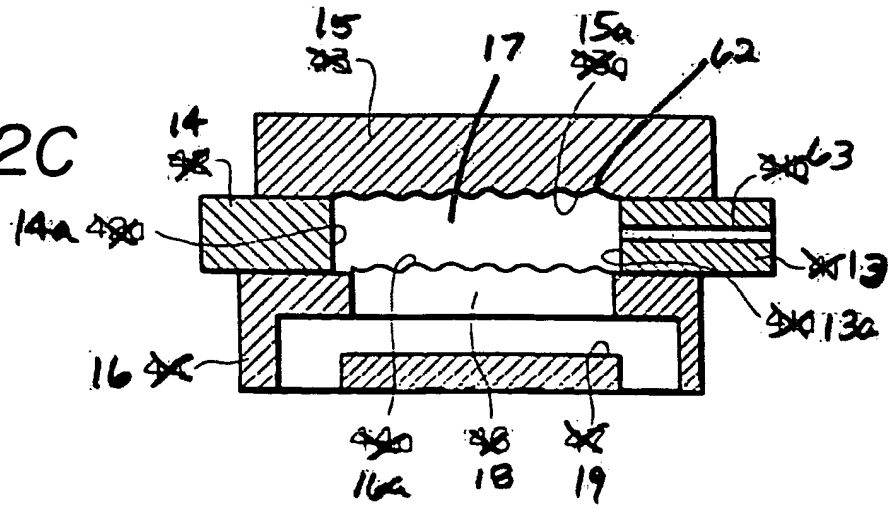




Fig. 33A

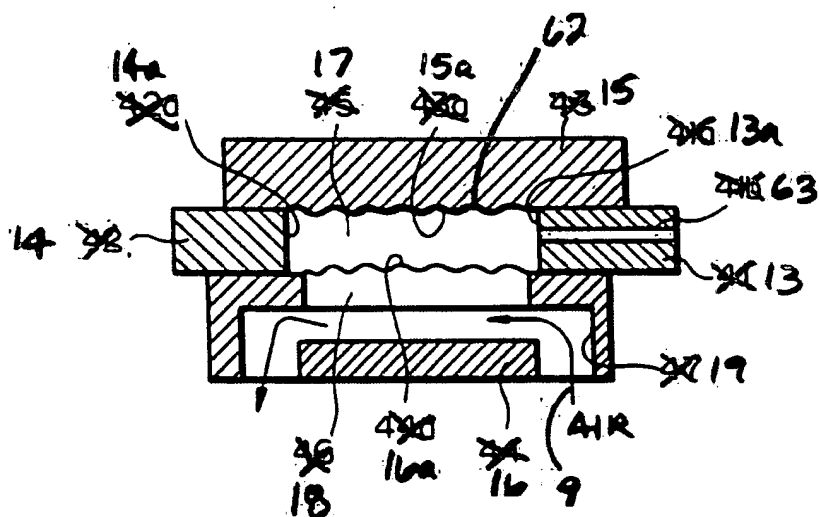
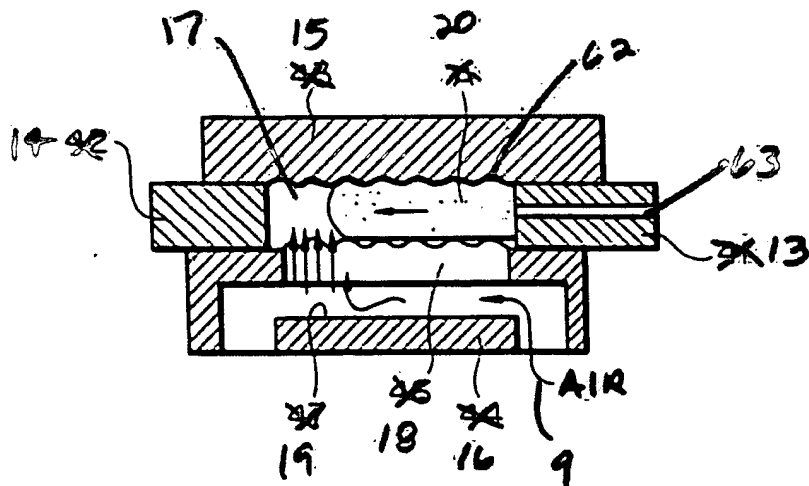


Fig. 33B



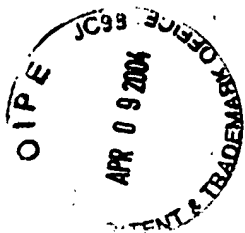


Fig. 34A

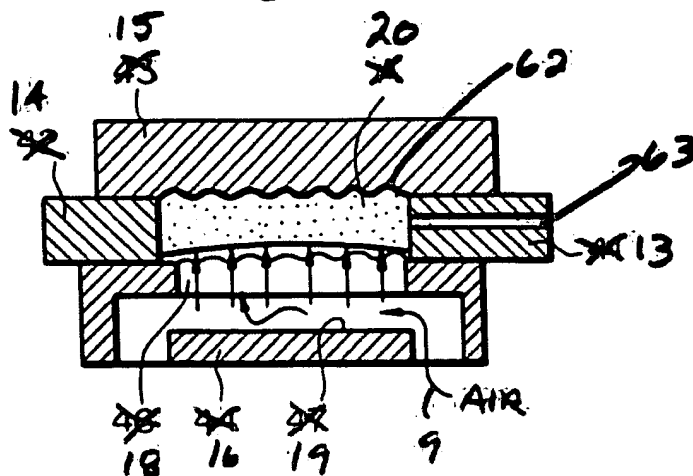


Fig. 34B

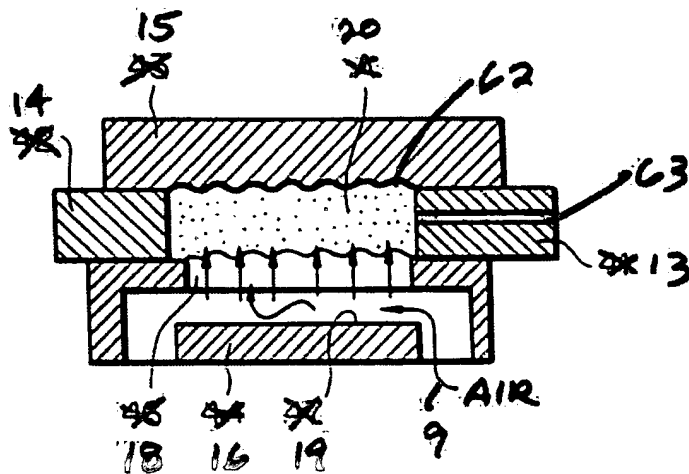
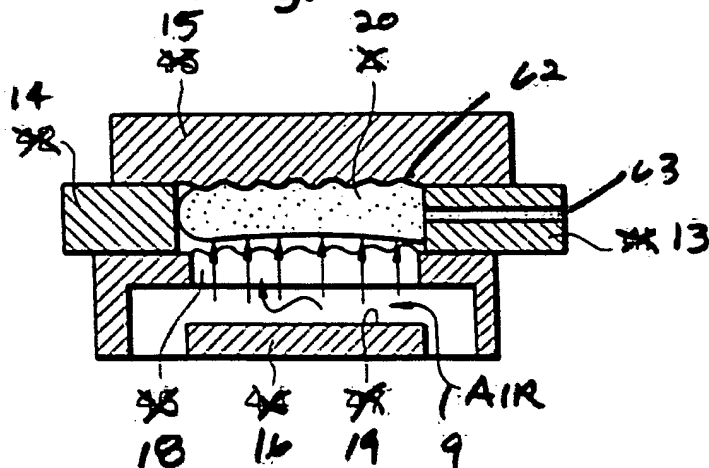
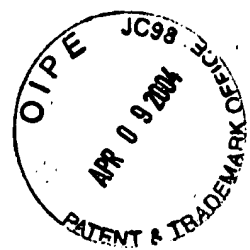


Fig. 34C





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Fig. 35

